and only then in the absence of wind. They enter dwellings if not too brightly lighted, but are not natural frequenters of human habitations. They breed in caves, rock interstices, stone embankments, walls, even in excavated rock and earth materials. The verruga canyons contain ideal conditions for such breeding. They hide by day in similar places or in shelter of rank vegetation. Deep canyons, free from wind and dimly lighted, are especially adapted to them. Thick vegetation protects them from what wind there is by day or night. This explains the very peculiar restricted distribution of verruga both local and altitudinal. The flies suck the blood of almost any warm-blooded animal, and even that of lizards in at least one known case. Thus they are quite independent of man, and this accords with the verruga reservoir being located in the native fauna. The habits of *Phlebotomus* correspond throughout so minutely with the conditions of verruga and the verruga zones that the writer wishes to announce his entire confidence in the belief that the transmission experiments, now about to be initiated with these gnats on laboratory animals, will demonstrate their agency in the transmission of the disease.

CHARLES H. T. TOWNSEND

CHOSICA,
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SCIENTIFIC BOOKS

Examination of Waters and Water Supplies. By JOHN C. THRESH. Second edition. Philadelphia, P. Blakiston's Son & Co. 1913. 644 pages; 36 plates; 16 illustrations in the text. Price $5.

This is a new edition of a book that is well known to American waterworks engineers. The author is one of the foremost water analysts in England and the book shows evidences that it is written by one who speaks with authority. It is needless to describe the book in detail.

Part I. relates to the examination of the sources from which water is derived. Part II. treats of the various methods of examining water and the interpretation of the results of such examinations. Part III. describes in more detail the analytical processes and methods of examination.

Most American readers will be particularly interested in the first three chapters that relate chiefly to ground water. The author describes numerous personal experiences in the detection of underground pollution, and an excellent description is given of the use of fluorescein, and other substances which may be detected either by sight or by smell, in tracing the course of water through the ground. From his experience he states that water which enters a dug well at a depth of six to twelve feet, depending upon the porosity of the soil, is usually efficiently filtered and purified. Water entering at a less depth is nearly always liable to be imperfectly purified and unsatisfactory in quality. The nearer the ground surface at which water can enter the greater the danger of pollution.

One statement of the author will strike most readers with surprise, namely, "Every known fact with reference to typhoid fever epidemics indicates that the typhoid bacillus alone is not the cause of disease, and it has long been suspected that some other organism either by itself or in conjunction with the typhoid bacillus was the cause." He then quotes from an article in the *Lancet* and describes a new anaerobic bacillus which has been found only in the feces of typhoid fever patients and which is agglutinated by their serum. It is a spore-bearing organism and is said to be capable of retaining its vitality for a very long period.

An interesting example of the growth of organisms in water mains is mentioned. A thirty-six-inch main at Hampton-on-Thames was recently taken up and found to contain fresh-water mollusks to such an extent that its bore was reduced to nine inches. It was estimated that ninety tons of mussels were removed from a quarter of a mile of this main.

Reference is made to the ill effect of the continued use of soft waters on the human system, and a method of artificially hardening water by the addition of calcium chloride and sodium bicarbonate is described.

Dr. Thresh makes occasional reference to permutit for purposes of water softening and recommends its use where the quantity of water to be treated is not large. This substance is coming into vogue both in this country and in Europe. By its use carbonates and sulphates of soda are substituted for the corresponding salts of lime and magnesia.

In discussing lead poisoning it is said that "no water acts upon lead unless both carbon dioxide and oxygen are present. It seems probable that when carbonic acid is in a certain excess a solvent action is exerted, whereas when oxygen is in excess the action is erosive."

The author's treatment of the biology of water is somewhat less detailed than that of its chemistry, but some experiences are related by him which are of interest, as, for example, the effect which the process of water softening has in reducing the number of bacteria in water. The bacteriological discussion is materially strengthened by quotations from Dr. Houston's answers to two specific questions, namely, "What bacteriological proof would you consider conclusive as to the pollution of a water with sewage, or manurial matter, and what bacteriological proof would you consider conclusive that a water is free from such pollution or so free that it is safe for drinking purposes"? The answers to these questions can not be stated in a few words, but Dr. Houston apparently regards a water which never contains *B. coli* in 100 c.c. as safe for drinking; a water which contains *B. coli* in 100 c.c. in less than half the number of samples examined as probably reasonably safe; but a water which contains *B. coli* in 100 c.c. in a majority of samples is one to be viewed with some degree of disfavor. Waters containing *B. coli* in smaller amounts in a majority of samples can not perhaps with absolute certainty be classed as sewage polluted, but the presumptive evidence increases to a more than proportional extent as a 10, a 1 and a 0.1 c.c. standard is infringed. Dr. Houston's standards appear to be somewhat more strict than those commonly discussed in this country.

The section of the book which describes in detail the mineral constituents of the alkaline waters of the London basin is interesting to analysts. More than four hundred of these analyses are given in detail.

In regard to the methods of analysis little need be said. They do not differ materially from those described in the first edition of the book and represent the ordinary English practise.

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Herbals, their Origin and Evolution. A chapter in the History of Botany. 1470–1670. By Agnes Arber. Cambridge, the University Press. 1912. Octavo. Pp. xviii + 253.

The reason for writing this book is well stated by the author in her preface as follows: "My excuse must be that many of the best herbals, especially the earlier ones, are not easily accessible, and after experiencing keen delight from them myself, I have felt that some account of these works, in connection with reproductions of typical illustrations, might be of interest to others." A little later she says more specifically: "The main object of the present book is to trace in outline the evolution of the *printed herbal* in Europe between the years 1470 and 1670; primarily from a botanical, and secondarily from an artistic, standpoint."

In carrying out this object the author divides her book into nine chapters, whose headings will give a fair idea of its scope, as follows: I. The Early History of Botany (9 pages); II. The Earliest Printed Herbals (23 pages); III. The Early History of Herbals in England (12 pages); IV. The Botanical Renaissance of the Sixteenth and Seventeenth Centuries (72 pages); V. The Evolution of the Art of Plant Description (15 pages); VI. The Evolution of Plant Classification (20 pages); VII. The Evolution of the Art of Botanical Illustration (50 pages); VIII. The Doctrine of Signatures, and Astrological Botany (17 pages); IX. Conclusions (6 pages). In addition there are two appendices, I., containing a Chronological List of the Principal